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(54) ANTIBACTERIAL-FUNGAL AGENT AND ANTIBACTERIAL-FUNGAL MATERIAL

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain the subject agent having a wide range of antibacterial-fungal activity and high safety e.g. in terms of cutaneous irritation by including a compound formed by binding an amino acid to silver ion as an active ingredient.

SOLUTION: This agent includes a compound, as an active ingredient, formed by binding (A) an amino acid (histidine, alanine, glycine, leucine, phenylalanine, glutamic acid, aspartic acid or the like or a derivative thereof or the like) to (B) silver ion. The compound is obtained by reacting the component (A) with the component (B) in a solution and precipitating a solid by treating the resultant solution with an organic solvent, such as IPA or acetone. It is preferable that about 0.5-2 mol(s) of the component A is added to 1 mol of the component B to conduct the reaction. The compound can be used as an antibacterial antifungal agent as it is and furthermore, can be used as an antibacterial-fungal material or an antibacterial-fungal composition by being carried by various carriers (solid carriers, liquid carriers, mixtures thereof or the like).

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CLAIMS

[Claim(s)]
[Claim 1] The antibacterial antifungal agent characterized by making into an active principle the compound which comes to join amino acid and complex ion together.
[Claim 2] The anti-[antibacterial] mold ingredient characterized by making a solid support support the compound which comes to join amino acid and complex ion together.
[Claim 3] The anti-[antibacterial] mold ingredient characterized by making liquid support support the compound which comes to join amino acid and complex ion together.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the anti-[antibacterial] mold ingredient using an antibacterial antifungal agent and it with high safeties, such as skin irritation, while having extensive anti-[antibacterial] mold activity.
[0002]
[Description of the Prior Art] In recent years, development and use of the functional material which gave the new function which applied the drugs which have anti-[antibacterial] mold activity to various life related materials are performed briskly. These functional materials give a new function by adding the drugs which have anti-[antibacterial] mold activity for the material concerned.
[0003] In case application of the antibacterial antifungal agent to these functional material fields is aimed at, while it is required that it should have an antimicrobial spectrum and safety extensive about the drugs concerned, to excel in that drugs do not have bad effect on the quality of a material, endurance, residual effectiveness, and economical efficiency etc. is demanded. Then, as drugs currently used for the old antibacterial antifungal agent, a benzimidazole system, a nitril system, an iso thiazoline system, a halo allyl compound sulfone system, an iodine propargyl system, a benzothiazole system, a phenol system, an organic tin system, a pyridine system, a diphenyl ether system, and a chlorhexidine system are raised.
[0004]
[Problem(s) to be Solved by the Invention] Such an antibacterial antifungal agent has many which do not show anti-[antibacterial] mold effectiveness sufficient with one kind of just drugs. Moreover, even if the anti-[antibacterial] mold activity which the drugs itself show is excellent, after a problem's arising in respect of compatibility with a material and applying to a material, surely sufficient anti-[antibacterial] mold effectiveness is not necessarily shown.
[0005] Furthermore, when seen about the safety of these antibacterial antifungal agents, there was much what shows Acute Oral Toxicity, skin irritation, membrane stimulative, etc., like what has strong anti-[antibacterial] mold activity, these operations were strong and there was a problem in applying such an antibacterial antifungal agent to a living environment generally.
[0006]
[Means for Solving the Problem] This invention is the antibacterial antifungal agent which combined amino acid and complex ion, and is the anti-[antibacterial] mold ingredient which made a solid support and liquid support support this compound further. The ligand of amino acid configurates this compound to silver, and the complex is formed, or amino acid and silver are considered to form the salt.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the anti-[antibacterial] mold ingredient using an antibacterial antifungal agent and it with high safeties, such as skin irritation, while having extensive anti-[antibacterial] mold activity.

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PRIOR ART

[Description of the Prior Art] In recent years, development and use of the functional material which gave the new function which applied the drugs which have anti-[antibacterial] mold activity to various life related materials are performed briskly. These functional materials give a new function by adding the drugs which have anti-[antibacterial] mold activity for the material concerned.
[0003] In case application of the antibacterial antifungal agent to these functional material fields is aimed at, while it is required that it should have an antimicrobial spectrum and safety extensive about the drugs concerned, to excel in that drugs do not have bad effect on the quality of a material, endurance, residual effectiveness, and economical efficiency etc. is demanded. Then, as drugs currently used for the old antibacterial antifungal agent, a benzimidazole system, a nitril system, an iso thiazoline system, a halo allyl compound sulfone system, an iodine propargyl system, a benzothiazole system, a phenol system, an organic tin system, a pyridine system, a diphenyl ether system, and a chlorhexidine system are raised.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention explained to the detail above, by having constituted the antibacterial antifungal agent as a compound which comes to join amino acid and complex ion together, inorganic and organic a solid support and liquid support can be made to support this compound, and it has the effectiveness of moreover not having bad effect on these support.
[0042] Furthermore, it excels in the anti-[antibacterial] mold effectiveness, weatherability, thermal resistance, a water resisting property, and reinforcement, and while having safety to the body, it has the effectiveness of excelling in endurance, residual effectiveness, and economical efficiency. Moreover, it has effectiveness also to antibiotic resistant bacteria.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Such an antibacterial antifungal agent has many which do not show anti-[antibacterial] mold effectiveness sufficient with one kind of just drugs. Moreover, even if the anti-[antibacterial] mold activity which the drugs itself show is excellent, after a problem's arising in respect of compatibility with a material and applying to a material, surely sufficient anti-[antibacterial] mold effectiveness is not necessarily shown.
[0005] Furthermore, when seen about the safety of these antibacterial antifungal agents, there was much what shows Acute Oral Toxicity, skin irritation, membrane stimulative, etc., like what has strong anti-[antibacterial] mold activity, these operations were strong and there was a problem in applying such an antibacterial antifungal agent to a living environment generally.

[Translation done.]

[Means for Solving the Problem] This invention is the antibacterial antifungal agent which combined amino acid and complex ion, and is the anti-[antibacterial] mold ingredient which made a solid support and liquid support support this compound further. The ligand of amino acid configurates this compound to silver, and the complex is formed, or amino acid and silver are considered to form the salt.

[0007] The above-mentioned compound makes amino acid and complex ion react in a solution, and the generated solution is manufactured by settling a solid-state with organic solvents, such as IPA and an acetone. A reaction is performed by adding about 0.5-2 mols of amino acid, and making it react to one mol of complex ion. The amino acid used is these derivatives, such as a histidine, an alanine, a glycine, a leucine, an isoleucine, a phenylalanine, a valine, an aspartic acid, glutamic acid, a serine, threonine, a thyrosin, an arginine, an asparagine, a glutamine, a lysine, a tryptophan, and a proline, etc.

[0008] The complex ion used can be used without limitation of the amino acid and the silver compound in which a reaction is possible to be used. Specifically, they are a silver nitrate, silver nitrite, perchloric acid silver, silver acetate, HOU ****-ized silver, etc. Furthermore, if complex ion and above-mentioned/, or the above-mentioned amino acid is dissolved as a solvent used for generation of a compound, it can be used without limitation of a well-known solvent. there are ketones, such as ether, such as hydrocarbons, such as alcohols, such as a water solution of hydroxylation alkali metal, such as water, a sodium hydroxide, a lithium hydroxide, a potassium hydroxide, or cesium hydroxide, a methanol, ethanol, or IPA, benzene, toluene, a xylene, a hexane, or a cyclohexane, and diethylether, and an acetone, and, specifically, independent or the thing which is being mixed and to use cuts this.

[0009] Thus, the compound obtained has the outstanding antibacterial antifungal action, it can be used for it as an antibacterial antifungal agent as it is, and further various support can be made to be able to support it, and it can be used as an anti-[antibacterial] mold ingredient, an anti-[antibacterial] mold constituent, etc. Then, as support which carries out in this way and is used, both a solid support liquid support and such mixture can be used.

[0010] As a solid support, an inorganic solid support and an organic solid support are raised, and they are a silica, hydroxyapatite, a zeolite, titanium oxide, etc. as this inorganic solid support. In the constituent containing these inorganic solid supports and this invention compounds, it is desirable that this invention compound is fixed by this solid support. The anti-[antibacterial] mold ingredient containing such an inorganic solid support and this invention compound does not have discoloration by the fall of the antimicrobial activity by the substitution reaction of the silver under existence of the salt which is the fault of the existing silver content antimicrobial agent represented by for example, zeolite silver, and the light of complex ion etc.

[0011] Next as an organic solid support, resin, such as various waxes, such as a wax, a varnish, lacquer, and synthetic coating material, polyethylene, a polyvinyl chloride, polystyrene, polyethylene terephthalate, acrylic resin, an epoxy resin, phenol resin, melamine resin, and a urea-resin, etc. is raised. As liquid support, organic solvents, such as water, alcohols, hydrocarbons, ether, and ketones, are raised.

[0012] Although especially the loadings of this invention compound in the antibacterial antifungal agent or ingredient of this invention are not limited, 0.01 - 90 % of the weight is desirable.

[0013]

[Embodiment of the Invention] The gestalt of operation of this invention is explained below.

3.40g (20mmol) of example silver nitrates of a gestalt of the 1st operation is dissolved in 50ml of water (solution A). L-histidine 3.20g (21mmol) and 0.90g (22mmol) of sodium hydroxides are dissolved in 20ml of water (solution B).

[0014] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 5.80g white precipitate was obtained. This compound checked generation of L-histidine silver compound from Fourier transform infrared spectrophotometry.

1.70g (10mmol) of example silver nitrates of a gestalt of the 2nd operation is dissolved in 5ml of water (solution (solution A).

[0015] L-alanine 1.78g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 2.50g white precipitate was obtained. This compound checked generation of L-alanine silver compound from Fourier transform infrared spectrophotometry.

[0016] 1.70g (10mmol) of example silver nitrates of a gestalt of the 3rd operation is dissolved in 5ml of water (solution A). L-glycine 1.50g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 2.42g white precipitate was obtained.
[0017] This compound checked generation of L-glycine silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 4th operation is dissolved in 5ml of water (solution A). 2.62g (20mmol) of L-leucines and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B).
[0018] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.44g white precipitate was obtained. This compound checked generation of an L-leucine silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 5th operation is dissolved in 5ml of water (solution A).
[0019] L(+)-isoleucine 2.62g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.53g white precipitate was obtained. This compound checked generation of an L(+)-isoleucine silver compound from Fourier transform infrared spectrophotometry.
[0020] 1.70g (10mmol) of example silver nitrates of a gestalt of the 6th operation is dissolved in 5ml of water (solution A). L(-)-phenylalanine 3.30g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.96g white precipitate was obtained.
[0021] This compound checked generation of an L(-)-phenylalanine silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 7th operation is dissolved in 5ml of water (solution A). 2.34g (20mmol) of L-valine and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B).
[0022] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.10g white precipitate was obtained. This compound checked generation of an L-valine silver compound from Fourier transform infrared spectrophotometry.
3.40g (10mmol) of example silver nitrates of a gestalt of the 8th operation is dissolved in 20ml of water (solution A).
[0023] 5.32g (40mmol) of L-asparatic acid and 3.20g (80mmol) of sodium hydroxides are dissolved in 20ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 8.10g white precipitate was obtained. This compound checked generation of a L-asparatic acid-silver compound from Fourier transform infrared spectrophotometry.
[0024] 3.40g (20mmol) of example silver nitrates of a gestalt of the 9th operation is dissolved in 20ml of water (solution A). 5.88g (40mmol) of L-glutamic acid and 3.20g780mmol of sodium hydroxides are dissolved in 20ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 8.49g white precipitate was obtained.
[0025] This compound checked generation of a L-glutamic acid-silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 10th operation is dissolved in 5ml of water (solution A). L-serine 2.10g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B).
[0026] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.48g white precipitate was obtained. This

compound checked generation of L-SERIN silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 11th operation is dissolved in 5ml of water (solution A).
[0027] L(-)-threonine 2.38g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.71g white precipitate was obtained. This compound checked generation of an L(-)-threonine silver compound from Fourier transform infrared spectrophotometry.
[0028] 1.70g (10mmol) of example silver nitrates of a gestalt of the 12th operation is dissolved in 5ml of water (solution A). L-thyrosin 3.62g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 4.74g white precipitate was obtained.
[0029] This compound checked generation of L-thyrosin silver compound from Fourier transform infrared spectrophotometry.
3.40g (20mmol) of example silver nitrates of a gestalt of the 13th operation is dissolved in 20ml of water (solution A). L(+)-arginine 6.97g (40mmol) and 1.60g (40mmol) of sodium hydroxides are dissolved in 20ml of water (solution B).
[0030] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 7.52g yellow precipitate was obtained. This compound checked generation of an L(+)-arginine silver compound from Fourier transform infrared spectrophotometry.
3.40g (20mmol) of example silver nitrates of a gestalt of the 14th operation is dissolved in 20ml of water (solution A).
[0031] 6.01g (40mmol) of L-asparagine-hydrates and 1.60g (40mmol) of sodium hydroxides are dissolved in 20ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 8.16g yellow precipitate was obtained. This compound checked generation of L-asparagine silver compound from Fourier transform infrared spectrophotometry.
[0032] 3.40g (20mmol) of example silver nitrates of a gestalt of the 15th operation is dissolved in 20ml of water (solution A). L(+)-glutamine 5.85g (40mmol) and 1.60g (40mmol) of sodium hydroxides are dissolved in 20ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 8.02g yellow precipitate was obtained.
[0033] This compound checked generation of an L(+)-glutamine silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 16th operation is dissolved in 5ml of water (solution A). L-lysine 3.65g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B).
[0034] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 4.40g yellow precipitate was obtained. This compound checked generation of L-RIJIN silver compound from Fourier transform infrared spectrophotometry.

1.70g (10mmol) of example silver nitrates of a gestalt of the 17th operation is dissolved in 5ml of water (solution A).
[0035] 4.08g (20mmol) of L-tryptophans and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 4.21g yellow precipitate was obtained. This compound checked generation of an L-tryptophan silver compound from Fourier transform infrared spectrophotometry.
[0036] 1.70g (10mmol) of example silver nitrates of a gestalt of the 18th operation is dissolved in 5ml of water (solution A). L(-)-proline 2.30g (20mmol) is dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has

stirred the obtained solution, and 3.20g white precipitate was obtained.
[0037] This compound checked generation of an L(-)-proline silver compound from Fourier transform infrared spectrophotometry. It checked antibacterial [of the silver compound obtained by the above] by the following approach.
Bacteria: 5ml of soy bean casein digest (SCD) liquid media was inoculated, and the SCD culture medium which carries out preculture for 24 hours and contains 35 degrees C of 2ml specimens for 0.1ml of 100 time diluents of the fungus liquid which carried out preculture was inoculated. 35 degrees C of existence of growth were checked after carrying out shaking culture for 72 hours.
[0038] Yeast: 5ml of glucose peptone (GP) liquid media was inoculated, and GP culture medium which carries out preculture for 24 hours and contains 35 degrees C of 2ml specimens for 0.1ml of 100 time diluents of the fungus liquid which carried out preculture was inoculated. 35 degrees C of existence of growth were checked after carrying out shaking culture for 72 hours.
Mold: The glucose peptone (GP) agar medium was inoculated, preculture was carried out for one week and 0.1ml of 24 degrees C of spore suspension which carried out preculture was inoculated into GP agar medium containing a 2ml specimen. 24 degrees C of existence of growth were checked after carrying out shaking culture for 168 hours.
[0039] Antimicrobial activity measurement followed the strain shown below.
Fungus 1.Candida albicans (Candida albicans)
2. Aureobasidium Pullulans (Aureobasidium Pullulans)
3. Aspergillus Niger (Aspergillus Niger)
4. Phoma Glomerata (Phoma Glomerata)
5. Alternaria Dianthicola (Alternaria Dianthicola)
6. Trichoderma (Trichoderma)
7. Penicillium Citrinum (Penicillium Citrinum)
8. Chaetomium Globosum (Chaetomium Globosum)
9. Cladosporium Sphaerospermum (Cladosporium Sphaerospermum)
10. Fusarium Moniliforme (Fusarium Moniliforme)
Bacteria 11.Escherichia coli (Escherichia coli)
12. Staphylococcus Aureus (Staphylococcus Aureus)
13. Pseudomonas Aeruginosa (Pseudomonas Aeruginosa)
The result is shown in Table 1.
[0040]
[Table 1]

形態例 / 菌類	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
3	○	×	×	×	×	×	×	○	×	○	○	○	○	○	○	○	○	×
4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
5	○	○	○	○	○	○	○	×	×	×	×	×	○	○	○	○	○	×
6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
8	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
9	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
10	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
11	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
12	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
13	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

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